



U.S. DEPARTMENT OF  
**ENERGY**

Office of  
Science

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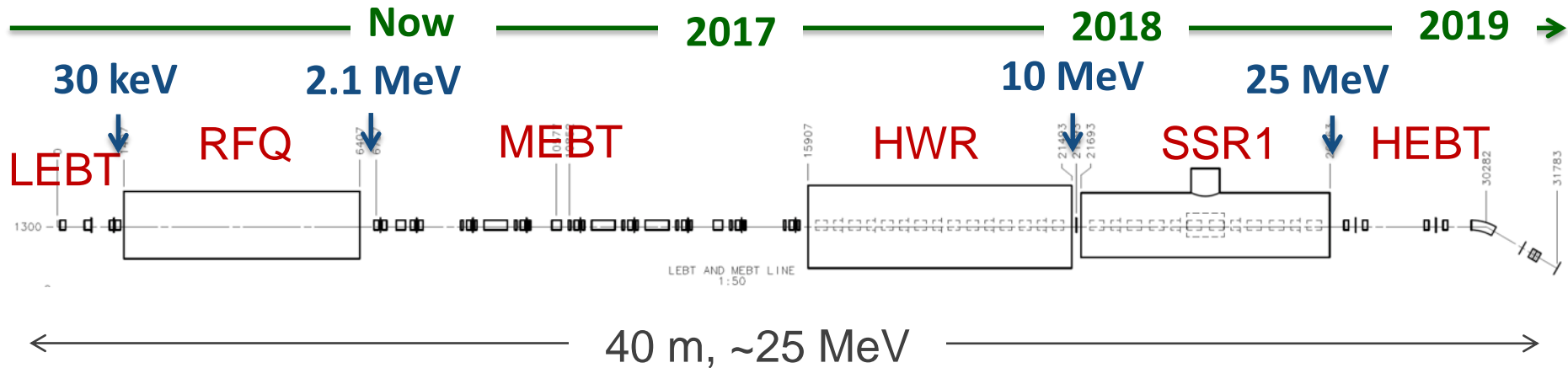
# PIP-II Injector Test's mode of operation in FY17 - Introduction

A. Shemyakin

PI-Test radiation meeting

14 July 2016

# PIP-II Injector Test (PI-Test) in 2016-2018



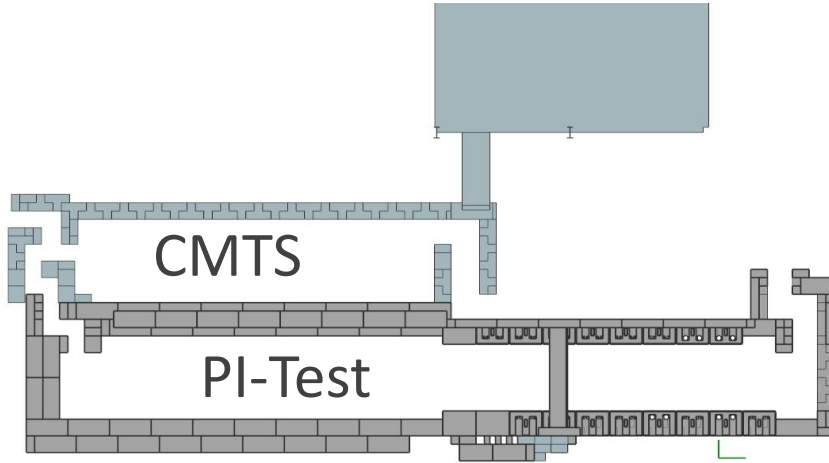
- Full PI-Test: 25 MeV, 2 mA CW
- Now: a short MEBT, 2.1 MeV, ~5 mA pulsed, 1% duty
  - ~50  $\mu$ A average; hope to increase to ~ 500  $\mu$ A average before the fall shutdown
- After Oct 2016: longer MEBT, need to test 10 mA CW
- 2017 – work with full-length MEBT
  - until stopping for cryomodules installation in 2018

## Goal for the meeting

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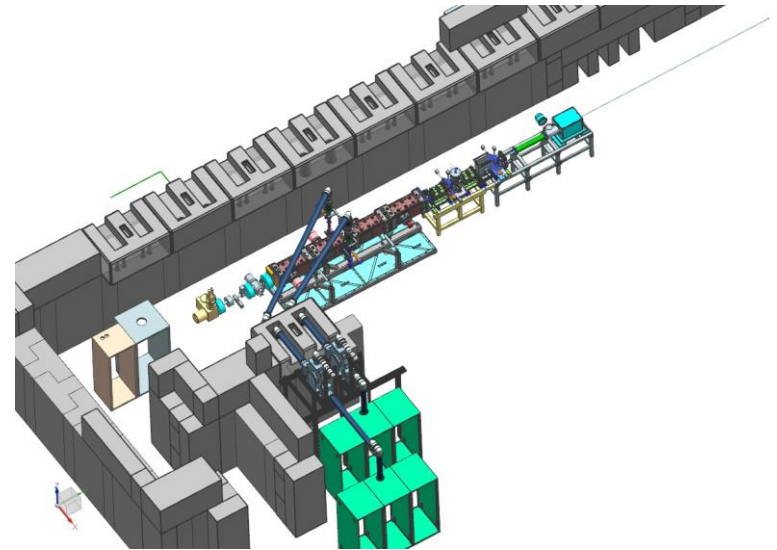
- Define a pass to be able of running the MEBT with 10 mA CW in Nov 2016 (from radiation safety point of view)

# Cave configuration



3D model of the final cave configuration.

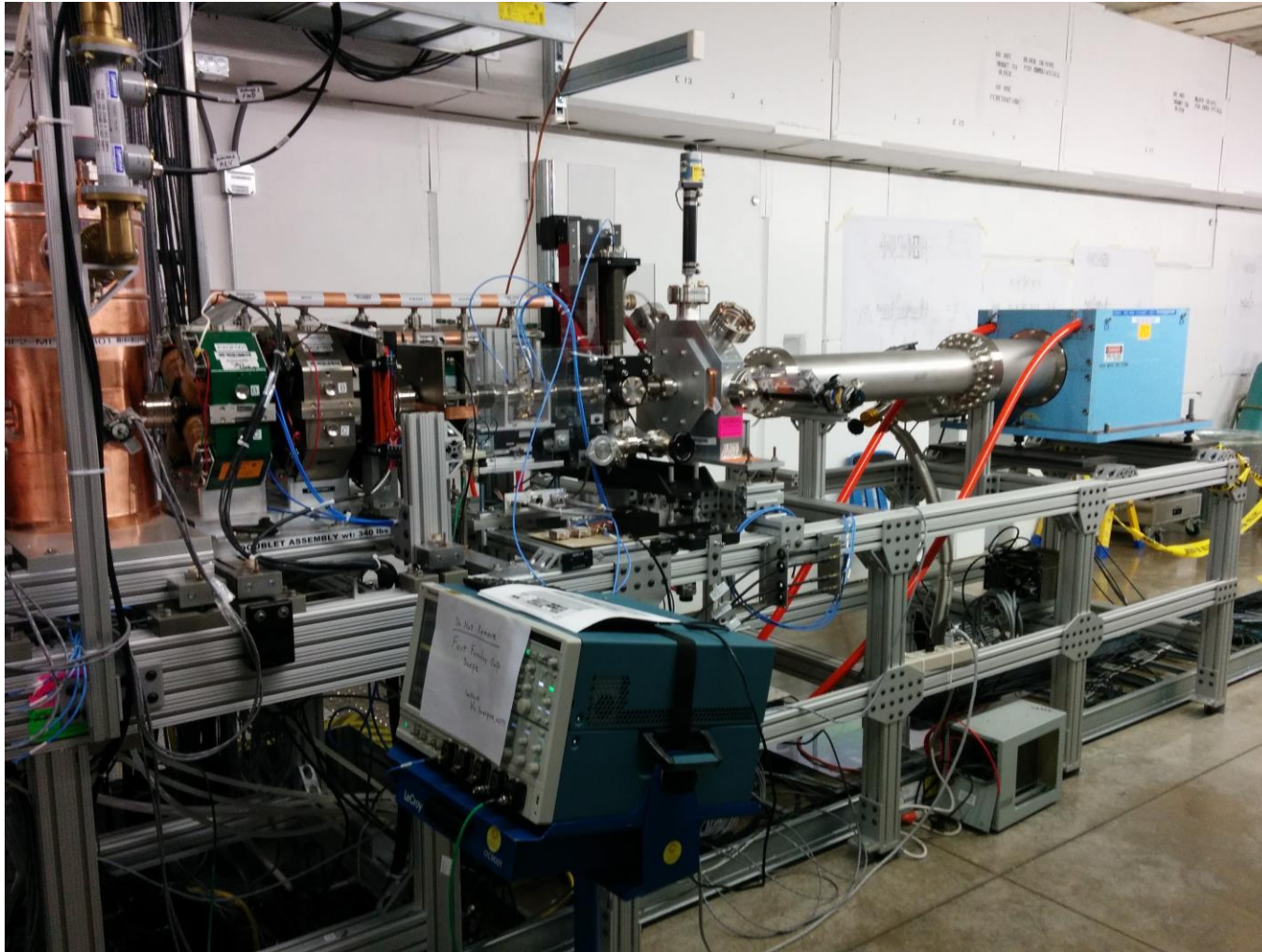
Preliminary shielding assessment was prepared by A. Leveling



3D model of present configuration. Part of the wall, roof, and CMTS are not shown for clarity.

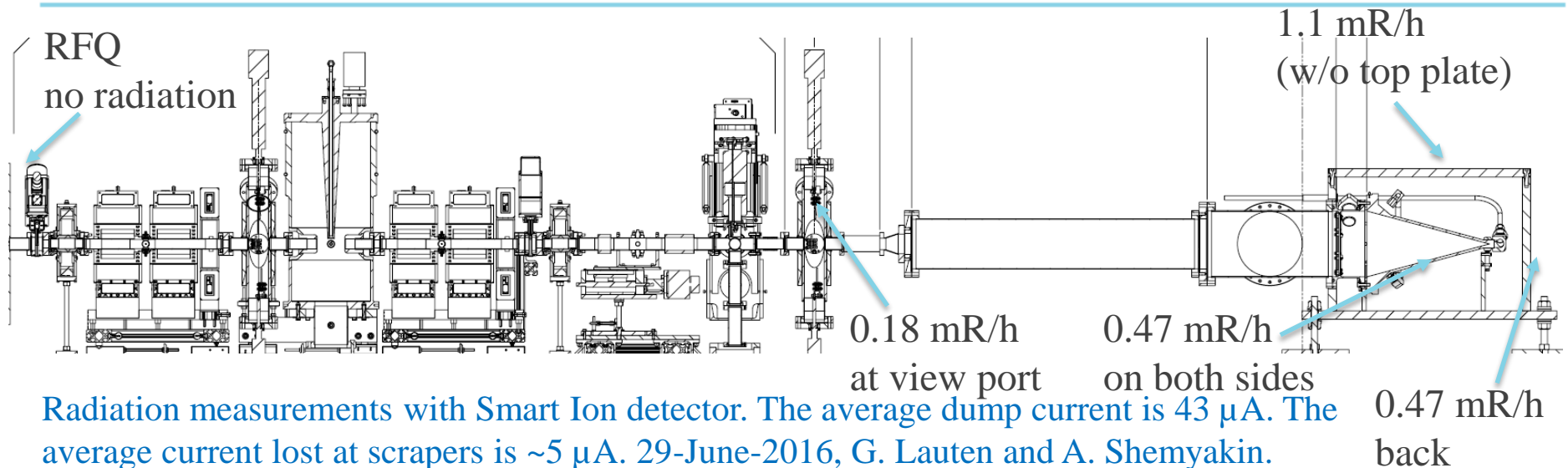
In reality, PI-Test cave is enclosed with concrete blocks and has only the permanent entrance at the Ion Source side and a temporary exit at the downstream side.

# Present configuration



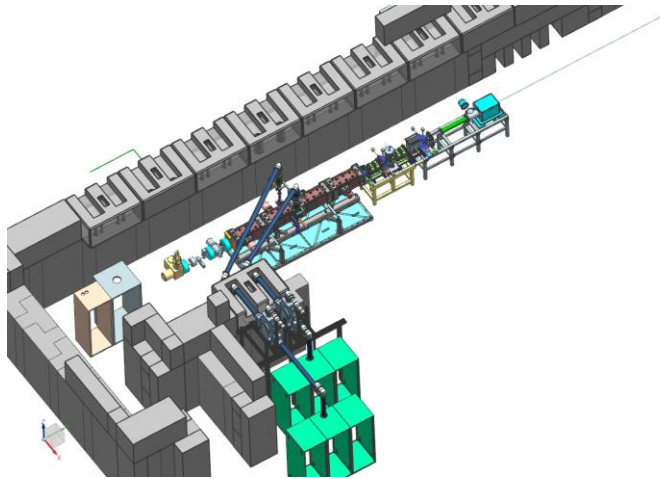
- Downstream portion of MEBT-1 with installed beam dump

# Present radiation situation



- MEBT-1: 2.1 MeV,  $\sim 5$  mA pulsed, 1% duty max
  - Radiation is detectable but max is 0.15 mrem/hr @1'
  - High-energy particles
- Interpretation from I. Rakhno and N. Mokhov:
  - Gammas from nuclear reactions; neutrons are low
    - Simulations are ongoing
- CW corresponds to increase of the average current by  $\sim \times 200$

# Present operation mode



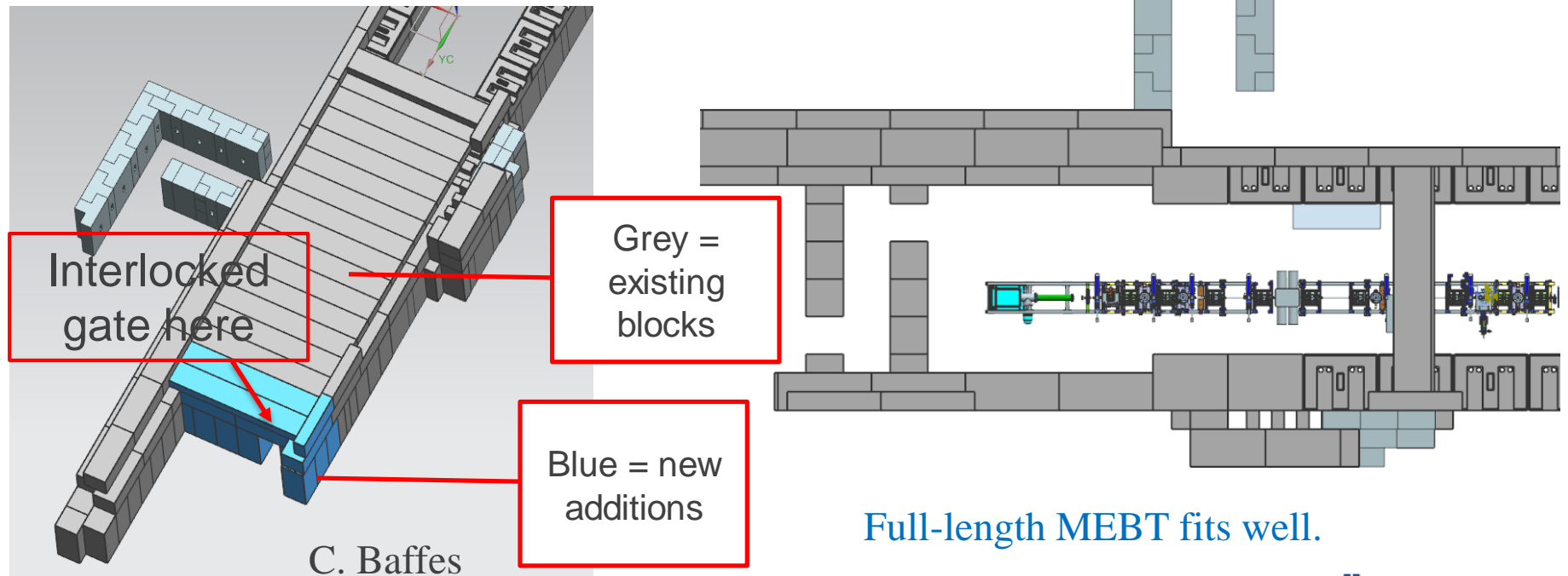
3D model of present configuration. Part of the wall, roof, and CMTS are not shown for clarity. In reality, PI-Test cave is enclosed with concrete blocks and has only the permanent entrance at the Ion Source side and a temporary exit at the downstream side.

- The PI-Test cave is closed but not interlocked
  - Radiation posting; short list of personnel authorized to enter
- Several layers of administrative protection
  - Pulse length is limited at 4 separate places
  - Almost all measurements are done with 0.01% duty
  - Entering the cave with beam running is infrequent
    - Primarily for radiation measurements



# Suggestion for CW mode

- Modify the cave to allow the full-length MEBT installation
  - Slightly longer than now + downstream labyrinth
  - Should work unchanged for the entire MEBT work until cryomodules installations
- Interlock the cave





## Questions to answer

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- Does the plan sound reasonable?
- What we need to get permission to run CW?
  - Documents
  - Assessment
  - Simulations
  - Measurements
- Who is doing what?
- How realistic is Nov 2016 goal?